

Developing a Message Interface Architecture for Android Operating Systems

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Abstract

User Interface is an essential part of the field of Human-computer interaction (HCI). It's involves the study, planning, design and uses of the interaction between people (users) and computers or machines. In modern human life this is essential such as mobile devices. We usually contact peoples via mobile devices, in such a way phone call and message passing, and this is very easiest way to contact with others. The intention of this paper is to provide an overview, analysis and proposed an idea of easy and light of message interface architecture for android operating system, which is most useable mobile operating systems in world. In generally we can contact with people through the message passing- on specific group messages or specific peoples. The overview include the basic definitions, a survey of traditional existing technologies of message interface architecture used in android devices, and finally the proposed idea and architecture of message interface for android devices. This paper also offers a comprehensive number of references for each concept, method, and application fields of interface design of HCI.

Keywords: HCI; Interaction; UID, Architecture; Interface.

1. Introduction

Human-computer interaction (HCI) involves the study, planning, design and uses of the interaction between users and computers. It's often regarded as the intersection of the computer science, behavioural science, design, media studies, and several other fields of study.

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HCI has been around for about 40 years [1]. The term was popularized by Card, Moran, and Newell in their seminal 1983 book, *The Psychology of Human-Computer Interaction*, although the authors first used the term in 1980 [2], and the first known use was in 1976 [3]. The term connotes that, unlike other tools with only limited uses (such as a hammer, useful for driving nails, but not much else), a computer has many affordances for use and this takes place in an open-ended dialog between the user and the computer. Another strand of research that has influenced the development of HCI is information science and technology.

Again the former is an old discipline, pre-dating the introduction of technology, and is concerned with the management and manipulation of information within an organization. The introduction of technology has had a profound effect on the way that information can be stored, accessed and utilized and, consequently, a significant effect on the organization and work environment. Systems analysis has traditionally concerned itself with the influence of technology in the workplace, and fitting the technology to the requirements and constraints of the job. These issues are also the concern of HCI. HCI draws on many disciplines, as we shall see, but it is in computer science and systems design that it must be accepted as a central concern [4]. For all the other disciplines it can be a specialism, albeit one that provides crucial input; for systems design it is an essential part of the design process. From this perspective, HCI involves the design, implementation and evaluation of interactive systems in the context of the user's task and work. The User interface design (UID) or user interface engineering is the design of websites, computers, portable electronic devices, appliances, machines, mobile communication devices, and software applications with the focus on the user's experience and interaction. The goal of user interface design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals—what is often called user-centred design. User interface design has been a topic of considerable research, including on its aesthetics [8]. Good user interface design facilitates finishing the task at hand without drawing unnecessary attention to itself. Graphic design may be utilized to support its usability, influencing how the user performs certain interactions and improving the aesthetic appeal of the design; design aesthetics may enhance or detract from the ability of users to use the functions of the interface [5]. The design process must balance technical functionality and visual elements to create a system that is not only operational but also usable and adaptable to changing user needs.

Generally now a days we communicate with each other's through mobile phone. This device is the most applicable fields of HCI. Two ways we are used to communicate, these are phone call and message passing. Basically the messages are divided by two types, single and group messages. Single message is very simple, but the group messages are not much easy. There are some limitations of group message. For these, we cannot select all entire contact lists at a time and another problem is if we want to select our special saved contact or groups shortly we can't, cause this is lengthy process to select contact randomly, and so on. In this paper my main intension is to focus on message interface design, importance and proposed idea that reduces the lack in and the lengthy process of message passing interface, also including the complexity of functionality.

2. The Interaction of Human and Devices

2.1. Architecture of Human and Mobile Devise Interaction

Mobile devices are a pervasive part of our everyday lives. People use mobile phones, PDAs, and portable media players almost everywhere. These devices are the first truly pervasive interaction devices that are currently used for a huge variety of services and applications [9].

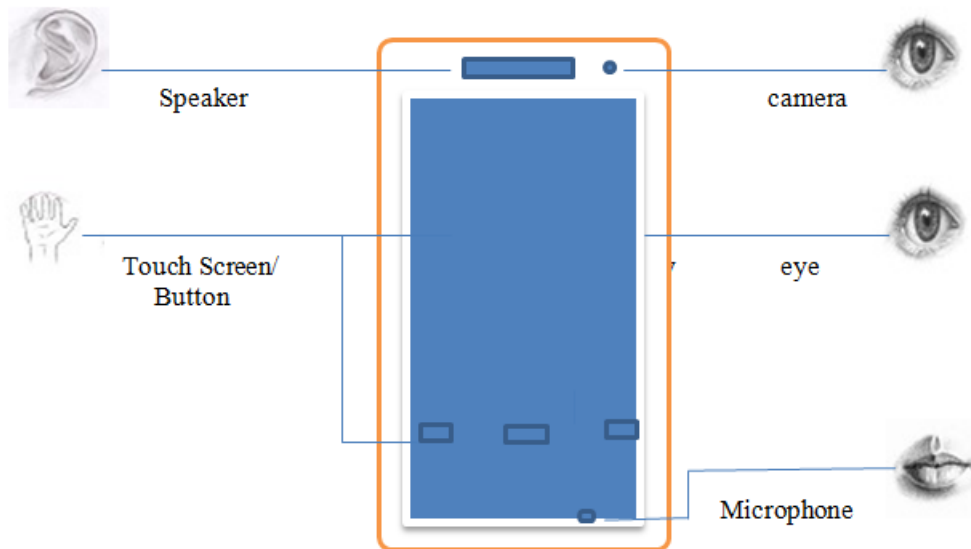


Figure 1: Architecture of Human and Device Interactions.

Human and mobile devices are commonly interact with each other by four mediums, they are

1. Audio
2. Video
3. Text
4. Photos

These are used by the four interfaces, which are related to interact with human and the mobile devices. Human can terminate the devices by the interfaces.

2.2. Interaction Mediums

Display:

The mobile and human interactions are most dependent on the displays. Human can operate all the functionality and operations by following the display orders. Display is the essential user interface for devices for interacts to others. The display is also input command instructor and output result viewer and most compatible output interface in mobile devices.

Speaker:

The interaction on human and devices are another interfaces is sound speaker, we can hear music, we can hear voice call, we can hear recording tone, and so on. This is an audio output interface in a mobile.

Microphone:

The microphone is interacting with human by receiving voice call and voice. The microphone is most preferable audio input interface on mobile. Audio interface receive the data and send them to the output audio section.

Camera:

This interface is another important part of mobile devices, which is receiving or capturing moments that act like as input interfaces on mobile devices. The camera architecture is that captures a photo and shows them to the output section like displays.

2.3 Principles of user interface design

Mobile interaction design or interface design is part of the interaction design which heavily focused on satisfying the needs and desires of the majority of people who will use the product [10]. The processes in mobile interaction design are in the following main types of activity [11], Understanding users, Developing prototype designs and Evaluation. Interface aspects such as fonts, colour palette, and graphical layouts can also influence an interface's perceived effectiveness. Studies have shown that affective aspects can affect a user's perception of usability [13].

- The principles of user interface design are intended to improve the quality of user interface design. According to Larry Constantine and Lucy Lockwood in their usage-centred design, these principles are [7].
- The structure principle: Design should organize the user interface purposefully, in meaningful and useful ways based on clear, consistent models that are apparent and recognizable to users, putting related things together and separating unrelated things, differentiating dissimilar things and making similar things resemble one another. The structure principle is concerned with overall user interface architecture.
- The simplicity principle: The design should make simple, common tasks easy, communicating clearly and simply in the user's own language, and providing good shortcuts that are meaningfully related to longer procedures.
- The visibility principle: The design should make all needed options and materials for a given task visible without distracting the user with extraneous or redundant information. Good designs don't overwhelm users with alternatives or confuse with unneeded information.
- The feedback principle: The design should keep users informed of actions or interpretations, changes of state or condition, and errors or exceptions that are relevant and of interest to the user through clear, concise, and unambiguous language familiar to users.
- The tolerance principle: The design should be flexible and tolerant, reducing the cost of mistakes and misuse by allowing undoing and redoing, while also preventing errors wherever possible by tolerating

varied inputs and sequences and by interpreting all reasonable actions.

- The reuse principle: The design should reuse internal and external components and behaviours, maintaining consistency with purpose rather than merely arbitrary consistency, thus reducing the need for users to rethink and remember.

According to Jef Raskin in his book *The Humane Interface*, there are two laws of user interface design, based on the fictional laws of robotics created by Isaac Asimov [6].

- First Law: A computer shall not harm your work or, through inactivity, allow your work to come to harm.
- Second Law: A computer shall not waste your time or require you to do more work than is strictly necessary.

3. Architecture of Message Interface

3.1. Traditional Message Interface Architecture of Android Operating Systems

Device Description: Samsung Galaxy Grand 2, Model No-SM-G7102, Android version 4.3, Base band version G7 102DDUANE2:

There are given some main steps of message interface architecture are shown below.

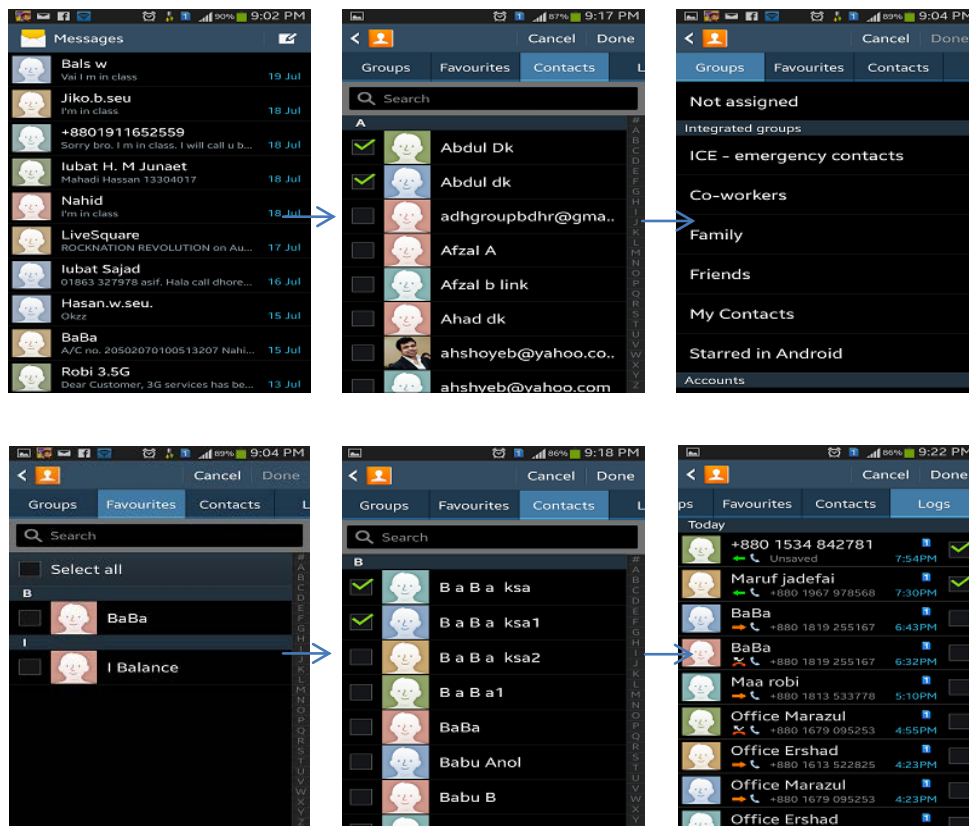


Figure 2: Architecture of Traditional Mobile Message Interface

3.2. Tree Diagram of Samsung Galaxy Grand 2 Smartphone Message Interface Architecture

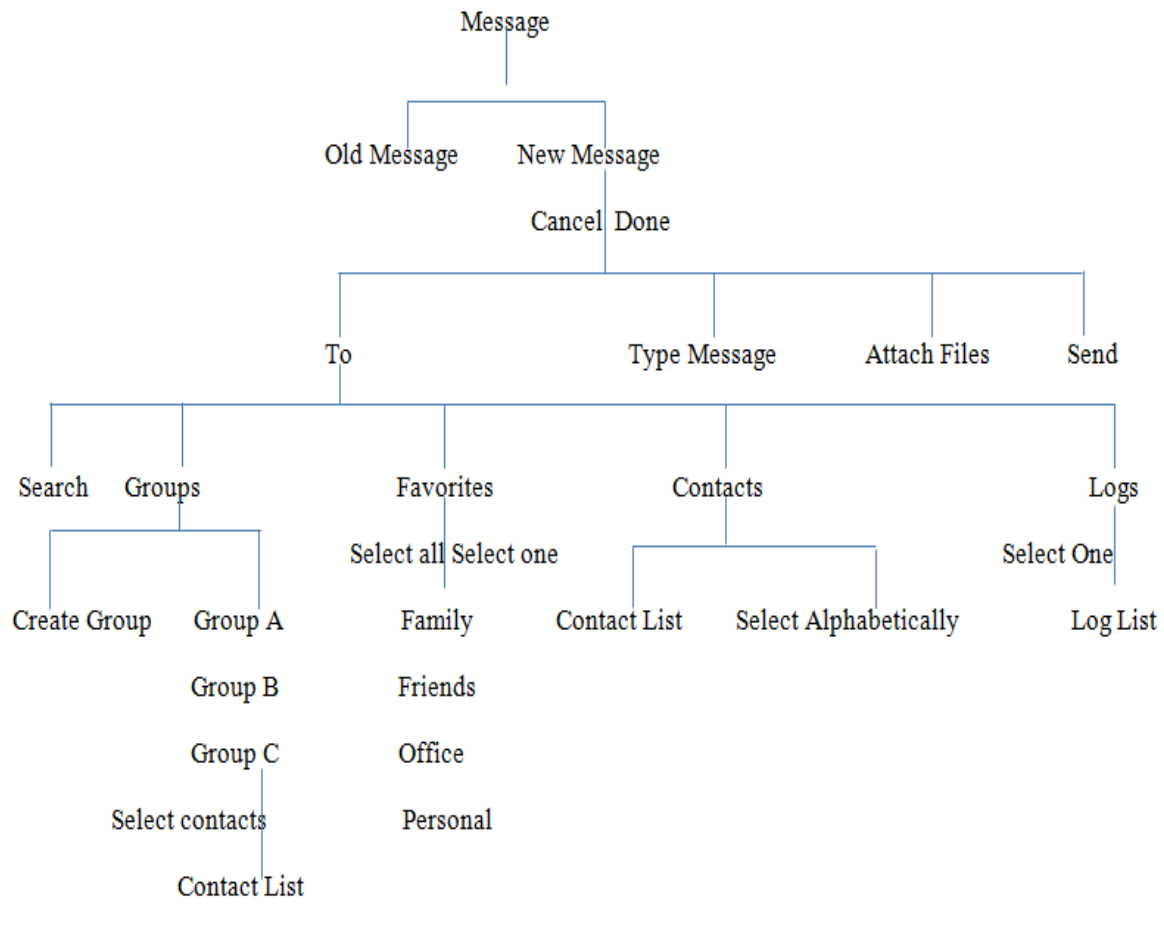


Figure 3: Tree Diagram of Traditional Mobile Message Interface.

3.3. Message Interface Operation

- Message--- New message
- New message--- Select Contact
- Select Contact--- Group-Family, Office, Friends, Others
- Select Contact--- Search
- Select Contact--- Favourites
- Select Contact--- Contacts
- Select Contact--- Logs
- Done

3.4. Limitations of Traditional Message Interface Architecture

- We have noticed in Group section that we can select group members by selecting one by one, but we couldn't select all the group members at a time.
- If we want to select a member from Favourites section, then we have to go the favourites section. If we

want to select another member from Contacts and Logs section, then we have to go those sections, and that would be a lengthy process for a user.

- The traditional message interface architectures couldn't select all the contacts from all the sections.
- Above limitations and complexities are time consuming and annoying for a user. It's reduces the big number of customers.

4. Proposed Architecture

4.1. Proposed a New Architecture of Message Interface for Android Operating Systems

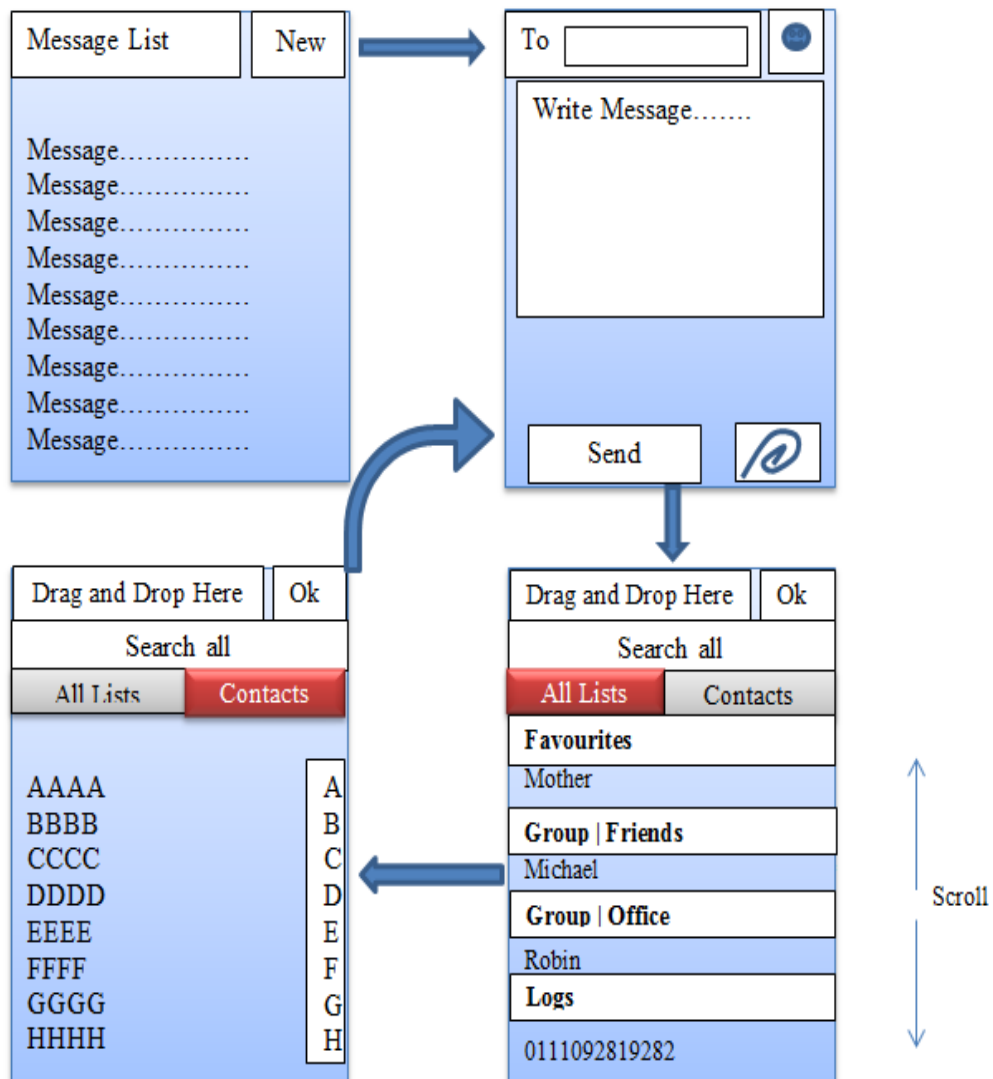


Figure 4: Proposed Architecture of Mobile Message Interface.

4.2. Tree Diagram of new Message Interface Architecture

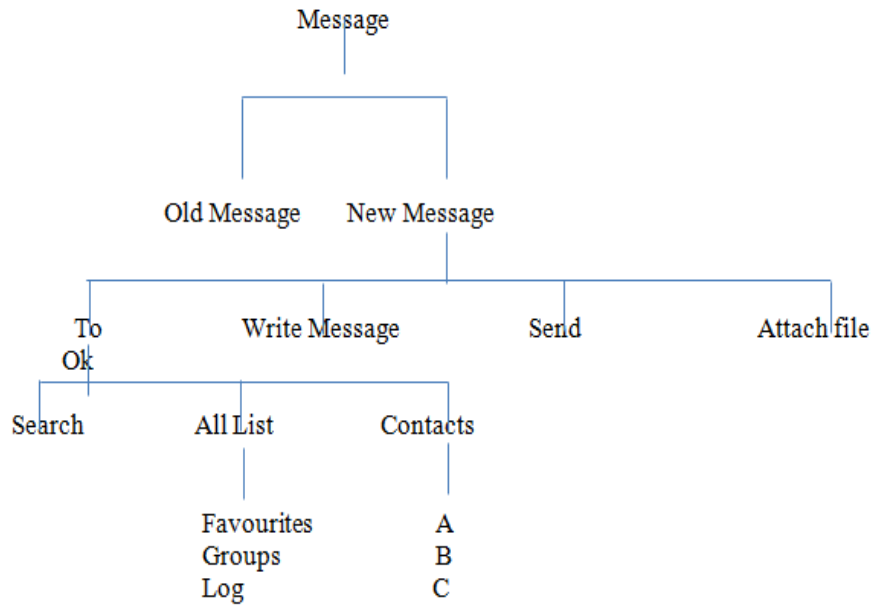


Figure 5: Tree Diagram of Proposed Mobile Message Interface.

4.3. Message Interface Operation

- Message--- New Message
- New Message--- Select Contact
- Select Contact--- Search
- Select Contact--- All List
- Select Contact--- Contacts
- Ok

4.4. Mathematical Explanation for the new Architecture by following Set Theory

Let's Consider, The Universal set U, and it has two subset, they are A and C A = All Set C = Contacts Set

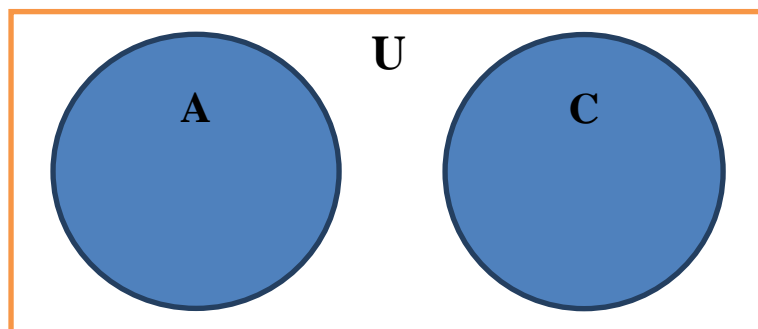
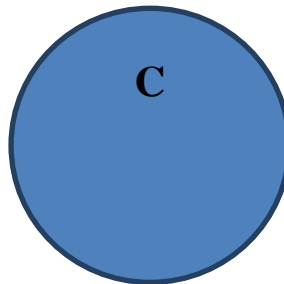


Figure 6: Diagram of Two Sets A and C from Proposed Architecture.

C has no subsets

In Venn diagram we can stand...



So, $C = C$

Figure 7: Diagram of Set C and it has not any subsets.

Now, A belongs three subsets F, L, and G

F = Favourites

L = Logs

G = Groups

G could have two or more subsets,

G = P, O

P = Personal

O = Others

In Venn diagram we can stand...

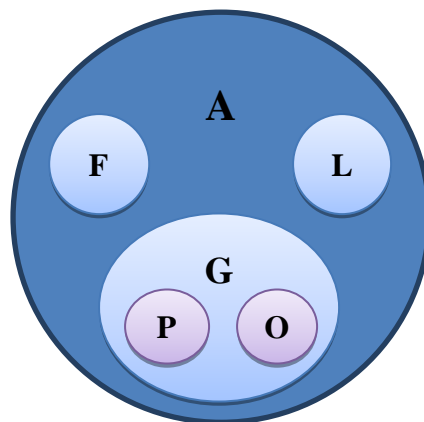


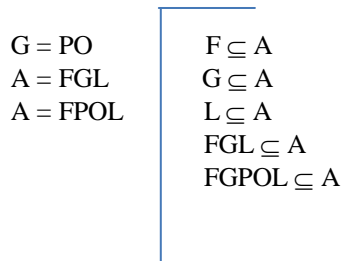
Figure 8: Diagram of selected all subsets of A by Union operation.

So, $A = F \cup G \cup L$ [Union operation]

$= F \cup G \cup L \cup P \cup O$ [Cause, $G = P \cup O$, then $G = PO$]

$= FGLOP$

In the figure 3 we can see that...



In Venn diagram the Universal set $U =$

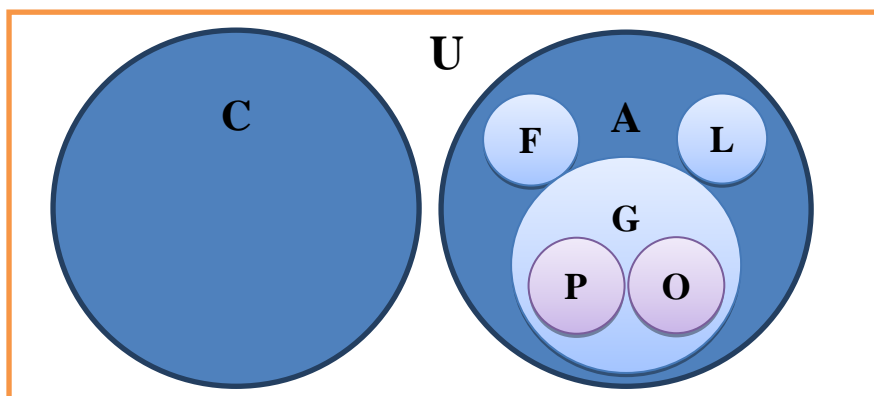


Figure 9: Diagram of selected all Sets and subsets by Union operation.

So, $U = A \cup C$

$= FPOL \cup C$ [For selecting all the elements by Union operation on two sets]

$= CFPOL$

$= CFLOP$

Result: $U = CFLOP$

So we can select vastly all the contacts at a time from only one page by scrolling up and down.

5. Discussion and Comparison

Table 1: Difference between Traditional Architecture and New Architecture of Message Interface.

Traditional Architecture	New Architecture
<ul style="list-style-type: none"> • In the Traditional architecture all contacts can't be selected at a time. • Message interface operation is more steps than the new architecture. • Contact selecting procedure is old, and used are boxes. • If a user wish to select many or all contact vastly this is difficult, cause the old architecture has one pages of each groups in the interface. • This interface is not reliable for a user to use. 	<ul style="list-style-type: none"> • In the new architecture all contacts can be selected at a time. • Message interface operation is not more than the old architecture. • Contact selecting procedure is latest and smart, used Drag and Drop technology. • A user can select all the contact easily, because it has only two pages for all the groups in the architecture. To view them by scrolling those pages up and down. • The new interface is very reliable, fast and easy to use for user.

6. Conclusion

Interface design is very important and practicing field in HCI, and also for business purpose for any smartphone development companies. The strong differentiating factors that characterize mobile devices from traditional personal computing such as desktop computers, are their ubiquitous use, usual small size, and mixed interaction modalities [12]. There are many operating systems smartphones are available, but the Android operating system is very popular operating systems among the others. The best operating system smartphones company's main focus is to improve their operating systems architecture to fulfil customer requirements for growing up their business. Some limitations and lacking should be the higher priority and concern for earning the highest business benefits for the companies. The required interface design for a device is essential, which should be operating very easy and without unwanted functionalities and steps. It's almost near impossible that there is no interface on a device, which has no limitations. In this thesis paper i have tried to present a better message interface architecture for Android operating system that is less complex and undesirable steps for creating a message to others, for this is easy to use and more reliable for a smartphone user.

7. Limitations of the study

Although this research was carefully prepared, I am still aware of its limitations and shortcomings. There are many manufacturers of android devices in market but this research was conducted with one android operating system Device. It might have been better if had more multiple manufacturer devices for this research.

8. Recommendations

For Further study need to experiment all the well-known manufacturer android operating systems smartphones and they should be the latest version of android. It is also recommended that experiment the research for a long time in a specific way such as test the developed application and deploy the application for desired operating systems.

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